

A framework for implementing Green Supply Chain Management: The Case of Petco Gulf

إطار عمل لتنفيذ إدارة سلسلة التوريد الخضراء: حالة شركة بتكو جلف

by

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**Dissertation submitted in fulfilment
of the requirements for the degree of
MSc ENGINEERING MANAGEMENT
at**

The British University in Dubai

June 2021

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Abstract

Growing global warming has caused irreversible effects to the environment, especially by supply chain industry. The main issue is, traditional supply chain logistics has affected the environment in many ways, through toxic waste, water, air, noise pollution. All this because of the conventional supply chain. To curb such environmental impacts companies, need to take strict actions in their supply chain. This dissertation aims to compare the differences between traditional SCM and GSCM; importance and need for GSCM. Taking PET bottles manufacturing company, Petco gulf U.A.E. as an example, it analyses the components of GSCM and different techniques that can be applied in a company to ensure that a company can switch from traditional SCM to GSCM. From this research, it was found that as Petco gulf is present in the U.A.E. it can take advantage of this and by applying the GSCM strategies against each of its components this will help the company by, increased overall gross profit with the decrease in cost since going green in its supply chain means reducing the overheads. This will give any company a competitive edge and boost its sales by building up the company's reputation amongst its stakeholders, especially the consumers. The problem in Petco gulf is; they have zero green supply chain management practices and need to implement the practices into their current supply chain. The research methodology used in this project is a quantitative methodology with a deductive approach. An interview questionnaire took place with the company's representative over the telephone. The major findings were that Petco gulf does not practice GSCM in its business, rather rely on conventional SCM. GSCM to be implemented smoothly in Petco gulf the goal was to find and analyse a framework that is best suited to develop GSCM in Petco gulf. This research concluded that to reduce their carbon footprint and become sustainable they will need to implement GSCM components and activities across their business along with the active involvement of its stakeholders.

Abstract in Arabic

يسبب الاحترار العالمي المتزايد في آثار لا رجعة فيها على البيئة ، لا سيما من خلال صناعة سلسلة التوريد. القضية الرئيسية هي أن لوجستيات سلسلة التوريد التقليدية قد أثرت على البيئة بعدة طرق ، من خلال النفايات السامة في المياه والهواء والتلوث الضوضائي ، كل هذا بسبب سلسلة التوريد التقليدية.

للمحد من مثل هذه الآثار البيئية ، نحتاج لاتخاذ اجراءات صارمة في سلسلة التوريد لهذه الشركات. هذا البحث يهدف للمقارنة بين سلسلة التوريد التقليدية و الخضراء و اهمية سلسلة التوريد الخضراء و الاحتياج لها و ذلك بأخذ صناعة علب البولي ايثيلين لشركة بتكو جلف بدولة الامارات العربية المتحدة كمثال ، و لدراسة عناصر سلسلة التوريد الخضراء و اختلاف التقنيات التي ممكن أن تطبق بالشركة لتحويل سلسلة التوريد التقليدية بها الى خضراء.

من خلال هذا البحث ، وجد أن بتكو جلف يمكنها الاستفادة من خلال تطبيق استراتيجيات سلسلة التوريد الخضراء على كل عناصرها ، فإن ذلك سيساعدها بزيادة اجمالي الربح مع انخفاض التكلفة و سيعطيها ميزة تنافسية و يعزز مبيعاتها.

منهجية البحث المستخدمة هنا هي منهجية كمية ذات منهج استراتيجي ، تم اجراء مقابلة مع ممثل الشركة عبر الهاتف وكانت النتائج ان الشركة لا تمارس سياسة التوريد الخضراء على الاطلاق وكان الهدف هو ايجاد حل و اطار العمل الانسب لتطوير سلسلة التوريد بالشركة.

Acknowledgement

First and foremost, I would like to take this opportunity to give my deep gratitude to my professor Sa 'Ed Mohammad Salhieh for his amiability by constantly guiding and advising me on this embarked journey in the completion of my dissertation. With his ongoing support, I was able to complete my project in time and without hesitation. His critical thinking and approach made me think of many various aspects of this project that I would not have thought about. Not to mention the level of patience he showed whenever there were errors caused by me and his ways of handling the entire situation in order for me to understand the concepts of the project. I would also like to thank my relatives for helping me to be able to take the right path of the project whenever I lost track of my project's plot through proofreading for me and giving me suggestions from their own experiences along with giving me a push as and when I needed it by always positively motivating me to throw in my hundred per cent potential. I would like to thank my classmates as well for being there whenever I needed them in times to help relating to my project.

Lastly, I would like to thank all those great inspiring people I got to meet with along this knowledgeable journey of my project who bolstered me through their intellectual professionalism and valuable advice.

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List of Abbreviations

- 1) GSCM – green supply chain management
- 2) SCM – supply chain management
- 3) SC – supply chain
- 4) RL – Reverse Logistics

Chapter I: Introduction

1. Background

It has become common for companies to change their supply chains and how they are managed. This practice is leading to better customer-supplier alliances that are improving trade techniques. Now we are seeing suppliers who are directly replenishing most of their customer's inventory. This form of directness in supply chains is enabling companies to beat transaction costs, decrease the levels of product obsolescence, reduce unnecessary bulk inventory levels, trigger a quicker market reaction, and increase sensitivity to customer needs and preferences. (National Research Council et al., 2000). Materials management, which refers to the overall management of processes through which raw materials are purchased, produced at the factory level, shipped, warehoused, and eventually distributed as finished goods, is becoming the key concern in supply chain management. This is because it is only through the monitoring of these processes that a company can properly ascertain its carbon footprint and level of greenhouse gas emissions. It thus goes without saying that materials management is a key component in green supply chain management. (Fenton, 2021)

Larson and Halldorsson, (2004) state that there are various ways through which managers can improve materials management so as to achieve a green and effective supply chain. However, they must first understand how most of their decisions impact the processes of purchasing, handling, storage, and recovery of assets. The second part involves logistics which refers to the totality of activities from the acquisition of raw materials to the final distribution of products to their retail points within the required time and in the required specifications. (Fenton, 2021) Managers can improve greatly their performance by cooperating with the suppliers, shipping

lines, distributors, and finally consumers so as to achieve efficiency in supply chain management. Increasingly, companies are assessing their environmental impact and reducing emissions through careful evaluation of the supply chain. In turn, they have become competitive, reduced product obsolescence, improved waste maintenance, repaired, and operated more efficiently on materials through better inventory management, lowered training costs, decreased overall material costs, and improved safety through reduced use of hazardous components. When this is attained, a company gains competitive advantage. Petco gulf is in the business of collecting wastepaper and manufacturing packaging products, the company's operation is favoured by environment conservations in the world; since the company plays a crucial part in maintaining a clean environment. On the other hand, the products from the company are recyclable; thus, it gets favour from international and national communities. A strength of the company is a strong brand name in the highly competitive market; the name assists the company to tap on opportunities brought about by globalization. One threat facing the company is high competition and the situation of world economies, there are increasing entrants in the industry.

1.1 Industrial and Company Overview

The recycling of PET bottles is considered to be an industrial standard process; which numerous engineering companies are to offer. The re-pelletizing way is also to be taken into account. Although the methodology causes thermal destruction, it has a lot of advantages, including intensive melt filtration, intermediate quality control, and modification by additives, product selection, processing flexibility increasing, and quality uniformization. Further processing is related to the production of the following materials: A-PET film for thermoforming, Bio PET packaging film, engineering plastic, filaments, non-woven, packaging stripes, staple fibre, and addition to PET virgin production. As far as PET is recognized to be an excellent barrier component, a lot of products can be made from the material (Ward, 2008). If the consumers are sure of the product safety, the inventory situation will be also improved. Thus, to attract public attention, the producers can explain that according to the American Chemistry Council, PET has been approved as safe by the FDA and the International Life Sciences Institute (ILSI). In 1994, ILSI stated that PET polymer has a long history of safe consumer use, which is supported by human experience and numerous toxicity studies. The American Chemistry Council cautions that products made with PET be used only as indicated by the manufacturer. To understand and know areas of improvement of the company's supply chain management, to get the information required for the report, the researcher will use internal information from the company's website, take research on GSCM and their SC and finally take an analysis where GSCM, if implemented on a company, will be considered (Simchi-Levi et al, 2007). Other than having, the physical goods there should be of the right quality and quantity. Companies that adopt a green supply chain enjoys a wider customer base; it is facilitated further by customer enlighten on issues pertaining to environmental conservation. The increased presence of goods from the international market

has resulted in an increase in demand for environmentally friendly production. Those companies who have focused on producing goods that are environmentally friendly have secured larger markets than those companies who have not. They are gaining more customer loyalty than those whose products and mode of production are not environmentally friendly (Fugate, Mentzer, and Stank, 2010). When a value is added to the company's products, the customer will get a higher utility from the company and will be willing to buy the products. The company on the other hand will benefit from the direct and indirect increase in sales resulting from its customer value increase.

1.2 Company Performance – Petco gulf case

Although Petco gulf is a Dubai-based PET manufacturing enterprise that has been in the PET manufacturing business for over two decades now, the company should not relax its value systems; it should invest further in technology and develop other ways of doing business. Since the company has been doing manufacturing for many years; thus, it has developed a pool of knowledge that it can depend on to improve its products and the value they give to customers further. With the leadership in the industry and its strong brand name, the company has the opportunity to use brand extension strategies to increase its sales further. It can easily penetrate other markets as a buyer of recyclable waste material/semi-recycled materials and as a seller of its variable commodity. The global situation is offering an opportunity to the company as this embarks on massive campaigns to advocate for the use of environmentally friendly products; thus, creating a demand for the company's products. With the current situation, the company is on a better platform to increase and diversify its operation through creating value in its customers and adding value to its products by implementing green supply chain management to its business. (Creswell, 1998). Petco gulf's raw materials are mostly PET products that need to be fetched and ensured they are of the right quality and quantity. Proper

supplies of the materials from suppliers working for the company as contractors to collect the material and from companies established for that business (Arntzen, Brown, Harrison and Trafton, 1995). Different industries require different packaging's; the company should aim at developing a strong research team that analyses the different industries so as it can advise the company effectively on the right material to fetch and use for products targeting certain industry. This will ensure that the company manufacturing, is kept with the right materials always (Mentzer,2001). The company should develop a 'just in time' supply management system; it creates mechanisms for efficiency and effectiveness in the system. It should undertake an internal analysis of its needs for production (Larson and Halldorsson, 2004). When procuring internationally, to reduce transport costs, the company should get the products in a semi-finished state. Any company in the country can produce the semi-manufactured items on a contract basis; this will increase raw materials and increase the base of material search. The UAE puts a lot of efforts to control the quality of water and air. The country enhances its industries to prevent pollution and increase autonomy. That is why recycling of various materials is at most important for the country. Recycling products is a crucial advantage for the UAE as well as for Petco gulf, as it is the best way to dispose of products and gain useful materials from them at the same time. It helps people and organizations to save their nature and resources. Recycling products provides an opportunity to use raw materials in the most effective way and to return them to the country's economic cycle. (*IvyPanda. (2019) Recycling in the UAE*). Petco gulf's plan is to prevent environmental pollution with the help of recycling and efficient resources utilizing simultaneously making a profit. They are targeted at the usage of ecological plastic in their products. The aim of the company can be associated with non-waste production, as they want to provide the customers with products that can be easily recycled at the end of life to create a new reusable product from the used existing material.

Through the process of PET customized product development, they tend to reduce the usage of raw materials used and pollution produced. Environmental protection and sustainability initiatives are long-term projects, and thus, they require effective solutions. In the UAE, threats to the environment may take place on a global scale because of the sea. They originate from industrial activities, domestic pollution, landfill, eutrophication, reclamation, and sedimentation, hunting, persecution, overfishing and unsustainable harvesting, alien introductions including predators on islands, disturbance, mismanagement, and development. The UAE has not been keen on environmental studies to assess the impacts of degradation on a large scale and widespread related loss of vital ecosystem elements. It is believed that laws and regulations should curtail adverse impacts on the environment by reducing or eliminating the above-mentioned environmental threats. The region faces several environmental threats. Fog and highland, for instance, also faces threats from overgrazing, the proliferation persecution and socio-economic changes, the latter apparent in the decline of traditional farming and land-use practices.

2. Research Problem Statement

Petco Gulf FZE. LLC a Dubai based company, has had to deal with many expenses and cost and mainly the increase in its carbon footprint pertaining to its entire current supply chain. Currently, Petco gulf only follows traditional supply chain management in their firm but if it switches to a green supply chain management system it will be not only environmentally beneficial for the company but also eliminate much of the financial strains of the company. It is quite clear that applying green supply chain management has no negative effects on the business. The research at hand will elucidate the role played by GSCM if implemented by a company (Petco gulf), its importance and needs for the firm. It will also identify the different ways in which the company can benefit from the enhanced practices of the GSCM (Mentzer et

al, 2001). The use of GSCM plays a pivotal role in the organizational procedures over at Petco gulf.

3. Dissertation Research Questions

- 1) How will the implementation of GSCM take place in Petco gulf?
- 2) What changes would occur in the supply chain of Petco gulf after implementing GCSM?
- 3) How will the impact on environment change after implementing GSC as compared to the previous traditional supply chain?

4. Dissertation Aims and Objectives

Recycling of plastic materials is very important in managing waste appropriately without subjecting the environment to any form of pollution. However, there are instances when it can be considered as an ineffective way of managing plastic wastes, given the associated costs. For instance, the plastic materials that are used to wrap products in the supermarket are very dangerous to the environment. Environmental agencies have been recommending the recycling of these materials as the most cost-effective way of managing them. This issue is crucial for the UAE, as the new approach is likely to enhance the income of the country and make it more independent. Recycled metals are much cheaper and can be mixed with new steel.

As for the research, the following are the main aims and objectives of the research:

- To render the use of existing literature and develop recommendations on how to change supply chain management to green supply chain management.
- To identify and fill in literature gaps.

- To be able to implement the GSCM system to a company (Petco gulf), which currently runs on the traditional supply chain system.

In order to implement GSCM in Petco gulf the following objectives need to be attained:

- Determine the component/elements of GSCM.
- Assess the current practices in Petco gulf with respect to the elements of GSCM and develop a GSCM framework.
- Develop a plan to implement GSCM in Petco gulf.

The purpose of this study is to determine the relationship between sustainability in the supply chain industry if hypothetically, a company shifts its supply chain to a green supply chain in addition, the study will also focus on examining the changes that occur if the green supply chain is implemented and its effect on the business.

5. Significance of the research study

This research study will help to find out the importance of sustainability in the supply chain industry and help organizations to evaluate the need for GSCM and techniques that can be applied in the company. GSCM have great impacts on supply chain firms and the environment. The supply chain worldwide has a bad reputation for the adverse effects it causes on the ecological system. Through this study, we can identify the various methods that can be implied by firms to their supply chain for it to help become a greener business model. And lastly assessing these green supply chain components by creating a GSCM framework through a deductive approach methodology.

6. The Organization of the Dissertation

Chapter one: this chapter of the dissertation includes the introduction of the chosen company for this project the industry overview to which the company belongs to. The reason for the selection of this company, the problem identified for which the project has been made and the aims and objectives to be achieved from this project that will result in helping fix the problem identified firstly.

Chapter two: this is where the secondary literature review come in for this project. Where all the research has taken place through, the use of the internet, journals, newspapers, articles, etc. to validate and show as proof about the GSCM, SCM and its problems that need to be addressed by the aims and objectives of this dissertation.

Chapter three: here the primary literature review takes place where with the help of a specific research methodology data is collected. Once the secondary information is collected about the company then, to achieve the aims of primary literature a questionnaire is prepared to be taken over the telephone and once the Q. and A. are completed then the data collected needs to be analysed in the next chapter.

Chapter four: once the questionnaire is answered as required next, in order to complete and give meaning to these findings through deductive research using a framework; to help use this developed framework over the company's SCM.

Chapter five: recommendation and conclusion. Here the overall summarization of the overall study has to be done through filtering the aims and objectives of the primary and secondary literature review was met and the new ideas that can be recommended to Petco gulf for future implementation in the company are this dissertation's recommendations and lastly, the

constrains and restrictions faced throughout the projects and what better can be done if this was study was to be carried out in the future intentionally.

Chapter II: Literature Review

This chapter will discuss about the green supply chain management, its characterization; definition, needs, importance, advantages. Along with a comparison on supply chain management (SCM) and green supply chain management (GSCM).

1. Green Supply Chain Management

A green supply chain is different from a standard supply chain as it adds a crucial factor to it which is taking into account the environment, because of this integrated factor the entire supply chain needs to be turned into an eco-friendly supply chain. This aims at helping the company economically, environmentally through materials and cost reduction. As well as it helps companies recognise the excruciating adverse effect the current supply chain has on the environment. (iiste, 2013)

Green supply chain management (GSCM) = green purchasing + green design (eco-design) + green manufacturing + green distribution + reverse logistics. (Fortaleza, 2013). This equation tries to explain the components that make up for the green supply chain management, which is when green purchasing along with green design, green manufacturing, green distribution, and most importantly reverse logistics will be equal to the green supply chain management for a company.

Figure – (1) shows a typical traditional supply chain components and their movements. Starting from raw materials to the end location of the product that is, the consumer.



Figure 1- Supply Chain Management

(McClymont 2020)

As depicted in figure 1, the green supply chain is made up of the following components; green procurement, green design, green manufacturing, green logistics (green warehousing, transportation, and distribution) and reverse logistics. Whereas a traditional supply chain is that in which all parties are linked indirectly or directly with the mission of trying to fulfil the customer's request. These parties include suppliers, manufacturers, transporters, retailers, and the company itself. A traditional supply chain is where there is the movement of products/services and information and funds from manufacturers to suppliers to warehouses to distributors to retailers to finally to the last destination i.e., the customers.

(National Research Council, 2000)

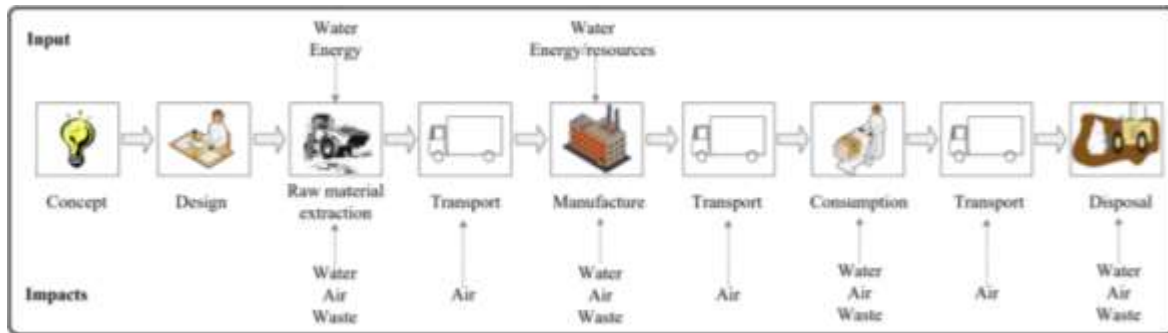


Figure 2 - Typical Supply Chain scopes and its relative environmental impacts

(Wyawahare & Udawatta, 2017)

From figure 2 it is very much clear that the impact of the traditional supply chain on the various aspects of the environment is inevitable until addressed. The figure clearly shows the different kinds of pollutions caused at the different stages of the entire supply chain. The impact of the product's manufacturing and production process on the environment can be generally classified as waste (all forms), energy and resources used (raw materials) consumption. Because of this reason companies need to shift from supply chain management to green supply chain management so that they can reduce or eliminate the wastage (of all kinds) caused to the ecological system, making the supply chain sustainable for the years to come.

2. Components of Green Supply Chain and their Measurement

As seen in figure 3, the different components that make up the green supply chain management, are discussed below in brief.



Figure 3 Components of Green Supply Chain Management

- 1) **Green procurement** this very first stage of green supply chain management can decrease the collective waste production till the end stage of the product life cycle. Therefore, this can save more cost in the sourcing of the green supply chain, making this a crucial component for the success of a green supply chain management. Green purchasing is a practice whereby a company chooses its suppliers and raw materials by filtering out and involving only those that follow eco-friendly ways of manufacturing products like, having environmental competency, eco-design ability, thrive off environmental performance, creating and updating environmentally friendly products and can check box the company's green procurement and eco-friendly vision and goals of the company. (Mathu K. 2019, p. 130)
- 2) **Green design:** this component consists of taking measures systematically on the environmental safety and health over the product life cycle during new production systems and process development with the ability to be able to reuse

or recycle at the end of its life. (Linto et al. 2007) green supply chain management's green product design includes environmental-friendly practices such as, designing products in such a way that it reduces the usage of raw materials, and the consumption of energy is less also at the time of production and the time period that it is in use by the consumer. Designing the product to accommodate the (3Rs) i.e., reuse, recycle, recovery of the used products materials and its components parts. Lastly, the production design should not include the usage of hazardous materials. These are the measurement to be taken under the green supply chain management with green design as one of its elements. Green design is an upcoming concept for companies that gives long term benefits in various areas of the business. This type of design can take the form of structural or product design. (Iiste,2013)

- 3) **Green manufacturing:** is not a choice but a compulsory need for the wellness and survival of the business in the competitive environment. (Pal, 2002). Green manufacturing is a production process by which companies use inputs that have as low as possible environmental impact, but at the same time being increasingly efficient together with generating little or no waste and pollution. Green manufacturing in green supply chain management can be measured when the company's GSCM results in a lowered raw materials cost, when the efficiency of the production units is increased of the products when there is a noticeable reduction in the environmental and occupational safety costs and the company's brand image is enhanced; all this with the help of advanced innovative environmental-friendly technology and eco-friendly raw materials. (Deif., 2011).

- 4) **Green distribution/transportation (warehousing and storage). Reverse logistics** is a process of getting used products from the point of consumption to the point of origin with the aim of recapturing value or proper disposal with the objective of reusing, recycling and/or remanufacturing the used product into the new product. (Rao & Halt, 2005).
- 5) **Another aspect of green manufacturing is remanufacturing**; this is when a company uses worn-out second-hand products as its raw materials and restores them to a new product ready to sell. Remanufacturing is a process called as recycling integrated manufacturing through product recovery; helping represent the transitioning of an already used product into a reusable product. GSCM's element, reverse logistics also includes factors such as product manufacturing, remanufacturing, complete product utilisation, handling logistics and waste management after the design finalization. Green distribution and reverse logistics; these components of the green supply chain management are measured by collecting the used final goods, after which there is a combined inspection of these products to deem them if safe for remanufacturing, selecting the product through the selection process, sorting, recycling the products, recovery, redistributing the product which can be sold again and disposing of the products that are unfit for remanufacturing. The main usage of a manufacturing setup is energy and water usage, so companies must innovatively try to aim at sustainability by recycling, reusing and through reverse logistics. Henceforth, this will help the company to get a competitive advantage by increasing their production efficiency and synergy, increasing their overall environmental performance, and decreasing the total production wastage by diminishing of expenses. (Zhu and Sarkis, 2004).

These components of green supply chain management will be discussed in detail in the next chapter of this document.

Adopting green supply chain management in a company is somewhat different from the traditional supply chain management as there are some stages that take place during these transitioning stages from supply chain to green supply chain there include; operational lifecycle and waste minimization as shown in figure 4.

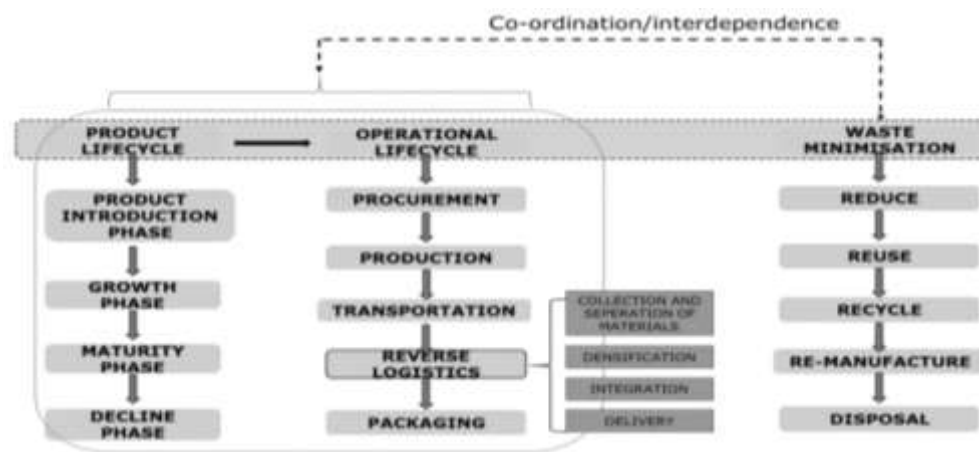


Figure 4 - The key transition stages from Supply Chain to Green Supply Chain

(Deakin University Australia, 2017)

In figure 4, the product life cycle has four complete stages of the product/service starting from the products' introduction phase which is where the product/service's design development takes place here as this is the first stage of making the product so to change to the green supply chain from the traditional supply chain the business needs to ensure that the product is being designed in such a way that it reduces the consumption of raw materials, energy, can be suitable for recycling or remanufacturing to fit in the transition phase of the green supply chain which is reverse logistics in its growth, maturity and declining phases where it can be environmentally efficient. Moving forward to the operational lifecycle which

comprises of procurement, production, transportation, reverse logistics and packaging; these phases have to integrate with themselves environmental considerations in each level changing up the policies, activities and programmes that govern the operation lifecycle stages. In the purchasing stage, buying reused and recycled raw materials from ISO 4000 certified and evolution of environmental performance (EPE) (Key Performance Indicator) suppliers as wells as considering the cost and quality of the performance (EPE in this case). Packaging, transportation, and distribution; in the conventional supply chain the business does not pay much attention to these components but on the other hand in green supply chain management, green packaging benefits the green supply chain by reducing materials and space utilization of storage improves due to innovation. In green supply chain management, the distribution centre's locations are also very vital to ensure that the time travelling to and from the location of the centre is decreased; to cut down on the fuel costs, transportation costs and lastly aiding in the reduction of the overall pollution caused by the trucks and other company transportation vehicles. The next stage that is not present at all in the conventional supply chain is reverse logistics, this component of the green supply chain is the most crucial one as this is what makes the traditional supply chain distinguished from the green sustainable supply chain management; reverse logistic can be termed as the forward supply chain of reusable and recyclable products/services and materials. From figure 4 we can see that reverse logistics consists of the collection, separation of the used materials transitional processing, then next is densification, integration, and delivery of the reused material/product. The most important uses and benefits of reverse logistics is the reduction in the overall cost of the products and conservation of natural resources (raw materials) used in the development of the product. Last but not the least in this transitioning process is the management of wastage produced. This stage has reduced, reuse, recycle, remanufacture and

disposal as the main subcategories that need to be focused on when undertaking green supply chain activities into account in a company. To achieve waste management a company can, use just in time (JIT) and total quality management (TQM) methodologies. (Deakin University, Australia et al., 2017). Green supply Chain Management has many benefits and advantages to itself which is one of the main reasons as to why industries are adopting and implementing it in their supply chain. Below is a brief on the various advantages of GSCM.

➤ Advantages of green supply chain management

A green supply chain offers more benefits than it can be noticed through the name itself. A holistic sustainable supply chain is one that makes sure that it runs on a socially responsible business practice. The so-called business practices are beneficial for the plant and the people involved in it directly or indirectly and overall supporting the growth of the business that the green supply chain is practised in. Below are a some of the main advantages of going green in a supply chain by implementing green supply chain management.

- 1) The green supply chain management concept helps in lessening the environmental degradation and control the air, water, waste, land, and thermal pollution caused by the supply chain industry if these green supply chain activities are applied in the business's manufacturing operations.
- 2) Green supply chain management helps in increasing the environmental sustainability, by decreasing the pollution and production cost. Simultaneously increasing the economic growth, increasing the customer satisfaction, building the image and reputation of the company thereby, eventually increasing their market share and profit.

- 3) Also, green supply chain management helps to increase the sales as it provides opportunity by exporting the products/services in pro-environment countries.
- 4) Customer, in a green supply chain customers play a vital role; so as to meet the customer's needs and demands, businesses adopt the green practices as this makes them stand out in the market that is, build a sustainable competitive advantage over their counter parts.

Cooperation with loyal customers proved to be useful to gain advantages of the green supply chain.

- 5) At an individual level, the advantages of adopting a green supply chain are, competitive advantages; for example, decreased price, sustainable products/services and undertaking suppliers with the same environmental practices and beliefs. Going green will open up a new potential market for selling.
- 6) At a national level; the green supply chain is significant to the government too, because as it will help the government to accomplish international competition in the industrial sector of the country.
- 7) Decrease transportation cost, adopting a green supply chain will lower the transportation cost as companies who follow a green supply chain will have to try to decrease their greenhouse gas emissions by making the shipment trip shorter, decreasing the fuel consumption, etc.
- 8) Reduces carbon dioxide emissions in the atmosphere, whereas from a business perspective; it is more increasing in the firm's asset's efficacy, decrease the waste production, growth for innovation and improvement, decrease in the operations and productions costs, reusing of the raw materials and used products through the application of reverse logistics, increase profitability and last but not the least added

value perception of business on the customer. Therefore, increasing the brand reputation.

- 9) New partnership potential, a business that is found to be sustainable attracts new prospective partners and/or investors that are in the hunt for partnerships opportunities for investments. (igps logistics 2019)

The traditional supply chain does the work for companies but the environmental impact that it has caused from many decades is what is making the government bodies, industries to bring about a change in their systems. The next topic discusses this in details for the necessities of green supply chain.

- The need for the green supply chain management.

The supply chain helps in connecting the customers with the products/services offered by companies across the globe, but this comes along with a huge cost to the environment.

A conventional standard supply chain of a company is responsible for about greater than 80 per cent of its greenhouse gas emissions. (Nutburn M. 2019).

Due to the environmental impact issues, nowadays customers are very well aware about the dangers of the manufacturing process caused by producing the products that is why there is a need for business to become green in their supply chain. The carbon footprints a product/service leaves behind from the manufacturing to the end product/service user is very important to note as this helps in understanding and making the supply chain environmentally friendly. (Westford University College, 2016).

Sustainable consumption issues and environmental business operations will be solved with the implementation of a green supply chain in a firm. At a macro level, the need for a green supply chain comes when there is an increase and need for the ability to design green

products/services or secondly, when there is a need to create eco-green products. (Nutburn M., 2019)

3. Literature Gap

To develop a framework to test the readiness of companies to implement GSCM and provide an action plan to do so.

Chapter III: Research Model Methodology

1. Conceptual Framework Proposed

The framework of a green supply chain that is proposed in this research project comes after extensive research of available literature and includes previous reviews which had very fewer perspectives, to enable practitioners, academicians, supply chain and logistics industry, company, and its manager as well as researchers to understand the integrated scope of green supply chain management's perspective so as to be able to easily apply it in the future. While carrying out research on this framework a deductive approach of research methodology was used for making this holistic conceptual green supply chain framework model.

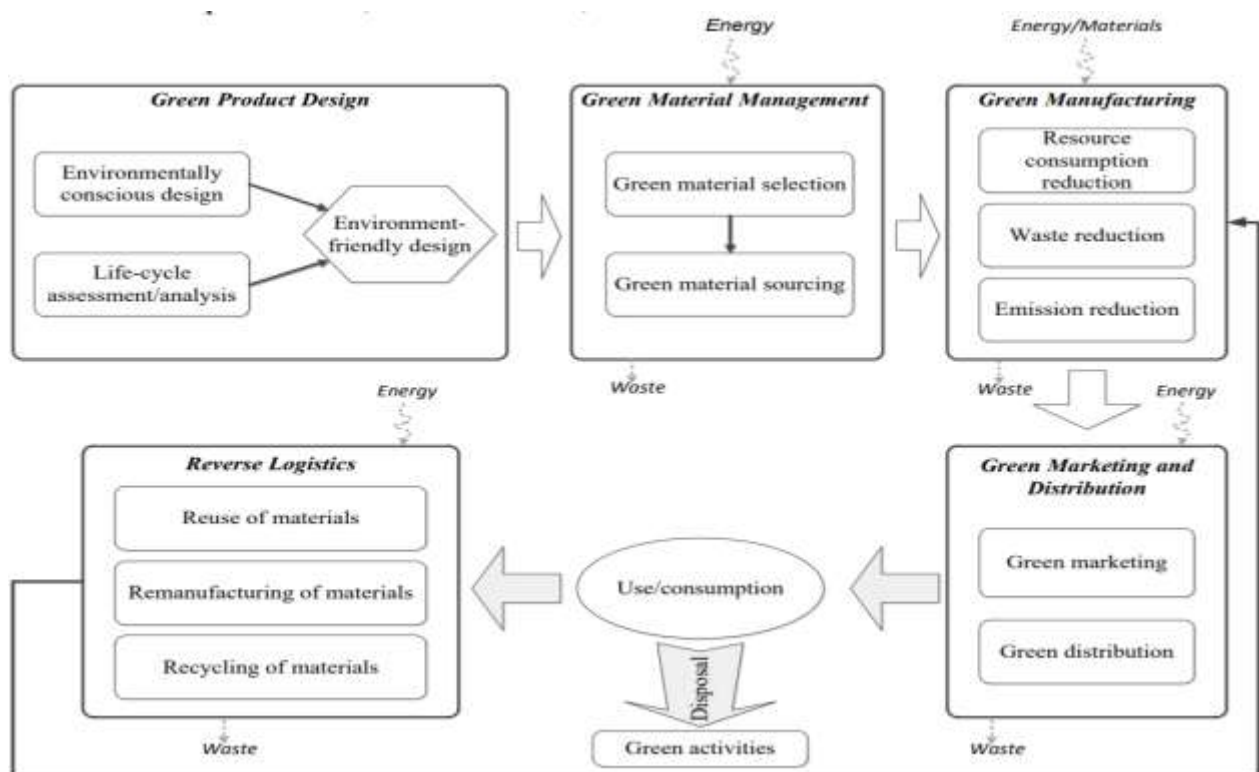


Figure 5 - GSCM Framework

(Deakin University Australia, 2017)

The figure 5 depicts a framework for green supply chain management process implementation.

The above framework in figure 5, will be used as an assessment methodology to evaluate the GSCM components if there are present in Petco gulf, if not then measures on the process of implanting the components will be portrayed in this research study.

From the above framework in figure 5, it can be noticed that to design a green product it has to go through life cycle analysis (LCA) and environmentally conscious design (ECD), green procurement of raw materials consists of green material selection and sourcing, green manufacturing includes operations like energy conservation, for example, electric, heat energy along with reducing the consumption of resources, reduction in waste materials and emissions. In the process of reverse logistics for this framework, either the end product can be remanufactured, recycled, or send for reusing it, again this helps in forming a closed-loop logistics program for the company. The various components of GSCM are discussed in brief below.

➤ **Green design**

LCA and ECD of a product are considered a crucial part of GSCM in previous literature. Life cycle assessment LCA is a tool used to analyse a product's life cycle PLC in terms of the impacts the product's processes and services cause on the environment, occupational health, and resource consequences. LCA's goal and scope related to the tracking of the material and energy flows of the product from the raw-material extraction out of the environment, processing of raw materials, production, transportation, distribution, usage, remanufacturing, recycling, and final disposal of it

back to the environment. Whereas companies use LCA as shown in figure 6 to make their product development leaving more towards a greener product and the overall environmental impact of the product in decreasing significantly in the initial stages of the product development.

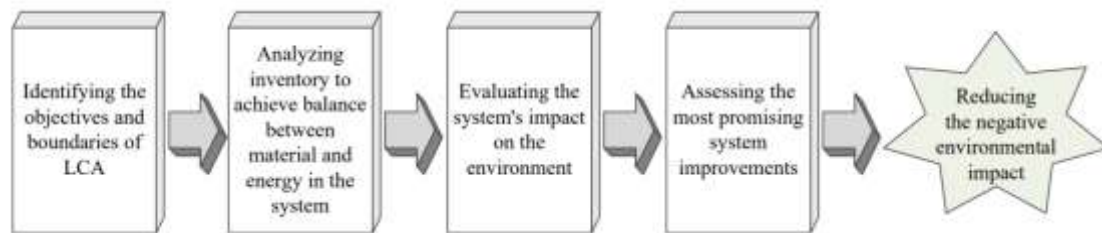


Figure 6 -Life cycle analysis (LCA)

(Deakin University Australia, 2017)

Environmental conscious design ECD or design for environment DFE: is a philosophy of designing products with the environment in mind to comply with the ecological sustainability principle. Under the ECD concept, the information gathered by the life cycle assessment LCA approach has to be moved to the initial design of the product being developed.

ECD consists of design for recycling (DFR) and designing for disassembly (DFD). DFD helps firms to identify the design specification of the product. Therefore, by using DFD a firm can decrease the complexity of the product structure in various ways like demeaning the parts of the products, increasing the utilization of generic materials, and using the fastener and joint types that are easily removable. Therefore, to use the DFD concept a company will need the specific tools and software designed especially for DFD usage. Whereas, in DFR it is only used for choosing the right and best material for the product.

➤ **Green material management (procurement)**

In this process of GSCM, the goal is to replace an existing material or find new material that is less hazardous and pollution causing than the previous material.

- **For GSCM to be applied (green procurement)**

- 1) All the various raw materials used to make up a product should be able to be easily separated.
- 2) Trying to use less material to develop a product simultaneously maintenance of compatibility of the current manufacturing infrastructure.
- 3) Same materials being used for developing different products.
- 4) Decreasing the number of 'secondary operations' to decrease the quantity of scrapped out material and easing to the recovery process.

- **Green Manufacturing Process**

Having green products design is not the only important goal of GSCM but to be able to address the current manufacturing problems caused by the traditional supply chain is also important along with being able to manufacture the product sustainability. Below is the way by which green manufacturing can be implied successfully

- 1) Decrease usage of virgin raw material and other resources and energies because this will eventually decrease the wastage amount in the manufacturing process.
- 2) Using pinch analysis, industrial energy, energy, and life analysis to help in decreasing the consumption of energy and resources.
- 3) Recycling, to get back the materials of used and non-functioning products.
- 4) Reduction of gas emissions by;
 - a) Controlling method; emissions and effluents are controlled, trapped, stored, treated, and disposed off with the help of pollution-controlled equipment.

- b) Prevention method of emissions is the second method; for reducing the effluents and gas emissions which can be achieved by reducing the usage of the materials causing such emissions or changing them and preventing all together by improving the housekeeping, substituting the raw materials used, recycling and/or through innovation in the entire process.

➤ **Green Marketing, transportation, and Distribution**

Green marketing is made up of modification of, product, production process, packaging, and advert modification. Green advertising is the most important in green marketing. It is defined as any advertisement that represents the image of environmental responsibility of businesses and supports and understandably addresses the relationship between a product/service and the biophysical environment.

➤ **Green Transportation and Distribution**

Green distribution plays a crucial role in helping to achieve sustainability in supply chain management because of its impact on the environment. Green distribution is co-dependent on green transportation where green transportation means to negate the negative impact on the entire ecological system of pollution caused in transit as compared to the traditional transportation service of the traditional supply chain management. Forming contract with potential suppliers with the new rules and regulation of the company that they must follow to comply and make their transportation services green is a great way to implement sustainable transportation.

➤ **Reverse logistics**

Reuse, recycle, remanufacture are the 3 functions of RL which is the most important distinct components of GSCM.

- 1) Reusing- the product/material again and again. Conventional reuse, wherein the product is used for the same purpose. New life reuse, i.e., using the product for a different or completely new purpose.
- 2) Remanufacture- include the repairing, refurbishing, overhauling of the used product for the purpose to extend its life after its first PLC has extended and derive value from the original core unit. This will create extensive business opportunity recapturing.
- 3) Recycle- the previous study of the GSCM framework majorly only consisted of recycling in reverse logistics as it is related to recycling and the environment. Recycling helps in decreasing the consumption level of raw materials, natural resources, energy usage, decreasing the air and water pollution as waste disposal and emissions will decrease respectively as virgin raw materials are not used.

1.1 Component 1: Green Procurement

Throughout the world there is climate change and global warming phenomenon taking place that is caused adversely because of various factors; for example, coal industries burned fossil fuels, destruction of the rainforests (deforestation) and farming of live stocks, etc. but this can be reduced if companies decided to shift from the traditional supply chain management to a green supply chain management as this would help to decrease the air, water and waste pollution along with decreasing the expenditure of the company that implements it.

While the concept of sustainable procurement is becoming more widely accepted and practised in the private sector as well as the international public sector, it is still relatively new with its origins only emerging in the mid-1990s. As such, it is an approach that is under constant development. What began as green procurement incorporating only environmental product criteria has grown to encompass social performance criteria as well as economic goals to further the notion of sustainable development. (Green purchasing and the supply chain, University of Louisville, n.d.)

Green Procurement is a process by which the company sources and acquires goods and services along with taking into consideration the environmental, social, and economic factors when doing the same. (Green purchasing and the supply chain, University of Louisville, n.d.)

- **Objectives of Green Procurement**

In a company the main goals of green purchasing would typically be:

- 1) To increase the company's performance efficiency with respect to ensure that the firm's suppliers are on board with their goals and objective regarding green procurement, research and select suppliers that follow standardized green procurement policy, make sure the suppliers produce products with less waste manufacturing.
- 2) Reuse and recycling of products is also an important goal for the procurement department if they want to be eco-friendlier, reducing manufacturing costs, more efficient and effective use of natural resources, the firms should try to be transparent and commit to eco-friendly development in the department and the company overall.
- 3) Developing new aims and objectives for the company which focus on having a greener firm, for example, partnering with suppliers to introduce them to the company's GSC principles by making green partnership agreements.

A company needs to develop sustainability principles and environmental management policy as a guideline for all the departments to follow. (*Sustainable Procurement*, United Nations Global MarketPlace, 2021.)

I. Benefits of Green Procurement

There are many important reasons for carrying out green procurement which helps the companies in many ways such as:

The importance of green procurement is that it helps in the reduction of harmful impact on the environment by reducing pollutions and waste it motivates companies to bring in innovation, helps in decreasing the costs of the business thereby increasing the overall profit eventually. Makes the supplier and company relationships much stronger. Introducing green

procurement helps in giving an important role to the product's lifecycle and its environmental footprint. (*Sustainable Procurement*, United Nations Global Marketplace, 2021.)

II. Implementation of Green Procurement

The traditional procurement process does not have much difference with the sustainable procurement although for a company to implement green procurement in their firm they must follow a certain number of guidelines like;

develop a set of objectives for their new green procurement decision, firstly the company needs to determine the overall effect the procurement action causes to the desired environmental and social outcomes, as well as the company, needs to monitor and assess when required to auto tune the overall outcomes to meet the company's desired procurement division's objectives. Below are the criteria for moving from procurement to sustainable procurement that can be implemented by any company. Planning and assessing the desires of the procurement undertakings for the company: Decisions are required at the sustainable final results a procurement technique is supposed to achieve; those are assisted with the aid of using some of the analyses, including a sustainable procurement risk, evaluation, deliver marketplace analyses, stakeholder analyses, etc. The sort of analyses used, and the choices will rely upon the sustainability trouble(s) that can be stricken by the procurement action. (R. Team, 2013)

- a) Planning the procurement requirement to make it sustainable- Procurement making plans include the transformation of a stated requirement or organizational aims and targets into achievable objectives for using to plan, finances and alter the procurement characteristic in the organization. As with

the conventional procurement technique, in supply chain management, procurement making plans and forecasting is vitally critical to make certain, effective, efficient, strategically feasible and sustainable result.

- b) Sourcing - supplier sourcing and evaluation strategies let the procurement department to eradicate poverty and help in gender empowerment, when the department looks out for suppliers from minority groups, specific geographical places and trying to apply more local suppliers to decrease the carbon footprint as well. When carrying out an assessment to help find out the area where most of the environmental damage takes place, and the majority impact comes from the raw materials purchased then, the supplier's environmental supply chain standards and policies will need to be arranged during the pre-qualification assessment of prospective suppliers. But if the assessment results depict that the problem is in the manufacturing phase of the product, then, the business' environmental management processes need to be changed. ((IAPWG), 2006). Any supplier's environmental overall performance must be one of the key standards utilized in the righteous and unbiased selection of suppliers for the business. Standards including the SA 8000 offer procurement departments with a method of integrating complicated issues in the standards while offering a method to confirm claims made with the aid of using potential suppliers. As extra businesses subscribe and abide with the aid of using requirements and agreements including the Global Compact, ISO 14001, EMAS, SA 8000, OHSAS 18001, etc. the easier the ideas and standards as mentioned with the benefit of using those, might be capable of being included into bidding documentation and processes. ((IAPWG), 2006)

- a) Solicitation documentation must include the green supply chains specifications and requirements designed in the stages. Adhering to this is the criterion for the selection of suppliers will be made available which the suppliers are required to meet these all-standardized processes.
- b) Monitor, check and control: as the name of the section suggests over here the supplier's activities are controlled and monitored in various methods such as monitoring their performances over the entire period of the contract, ensuring that the delivery deadlines are met after-sales and warranty services are met as well. Setting the sustainability criteria and monitoring them at every phase. Afterwards, measuring the final outcome to the initial project outcomes that were set before. Later on, these results should be then applied to the first stage of the procurement supplier selection. Specific suppliers may want to be evolved to facilitate meaningful measures according to the company's standards.
(IAPWG, 2006)

When trying to implement sustainable procurement crucial norms and procedures it starts to develop difficulties in the initial stages because of the existing rules and regulations especially on the norm of competitive bidding on an international platform. Implementing changes to the procurement department's processes can be seen as favouritism amongst suppliers from certain countries due to the fact that they are more advance in areas of environmental and social supply chain performances henceforth, this becomes a very challenging proposition. (IAPWG, 2006)

III. Assessments

There are many ways by which we can measure and assess green procurement few of the most important are mentioned below:

- Sustainability assessment standards- assessing a supplier's contract is crucial in the procurement department's process. The standard by which the contract is obtained comprises of a number of criterial factors that the supplier needs to meet.
- Tender assessment is where an in-depth guideline is provided to the suppliers so that they can meet the specified criterial requirements and factors pertaining to the assessment from a cost, environment, and quality point of view. (IAPWG, 2006)
Factors that are secondary to the pre-selection of the suppliers in the contract are mentioned as sustainable criteria. Sustainable evaluation criteria are important to implement consistency in the assessment of the sustainable performances of the supplier's biddings and proposals. ((IAPWG), 2006)

Some of the environmental evaluation criteria to undertake in a contract are mentioned below:

- 1) Air pollutants - to encompass measures taken to lessen emissions, especially of key pollutants, and searching at efforts to exceed statutory necessities.
- 2) Biodiversity and habitats - a particular element of land use, wherein biodiversity and critical habitats are recognised, and measures are taken to shield and embellish them.
- 3) Climate change - measures taken to display and decrease greenhouse gas emissions must be highlighted on this criterion.

- 4) Resource use and intensity - to encompass energy, water, uncooked materials, and land as resources, and to the cognizance of the performance in their use. Linked to waste, air pollutants and water pollutants.
- 5) Transport - to do not forget measures that lessen normal shipping necessities, and to inspire a modal shift far-far from street shipping (humans and freight).
- 6) Waste - to encompass measures to lessen, re-use and recycle wastes.
- 7) Water high-satisfactory - to encompass measures to lessen discharges, especially of key pollutants, and searching at efforts to exceed statutory necessities, and worthwhile efforts to meet water high-satisfactory targets. ((IAPWG), 2006)
- 8) Ensuring, the suppliers the company deals with following environmental ISO standard for sourcing raw materials.

1.2 Component 2: Green design and product development

The green design term was coined by the Manufacturing Research Association (MRA) of Michigan state university in the year 1996. It is a concept in which a firm thrive to make their product and/or services sustainable and ecological by making it energy-efficient, cost-efficient, designed for lifelong, minimal environmental effects in terms of raw materials and finished products as in the entire product life cycle PLC of the products. (Tao F., Zhang M. & Nee Y., 2019)

- **Objectives of developing green design in a company are as follows:**

The creation of green design in green supply chain management will help to decrease the negative impact on the environment and increase resources utilization efficiency within the closed loop of forwarding supply chain and reverse supply chain. (Tao F., Zhang M. & Nee Y., 2019,)

- a) To develop supply chain manufacturing in order to be able to carry out optimal resource utilization since the start i.e., product design so as to help in minimise the environmental impact.
- b) To ensure and give suppliers design specification with the company's set guidelines for environmental requirements.
- c) When designing the product, it should be taken under consideration that it decreases the consumption of raw materials, as well as usage of hazardous materials in the manufacturing process, energy, overall pollution, the waste generation in product usage and manufacturing process, is also decreased.
- d) When designing the products, keep in mind the recycling, reuse, recovery factors for the finished goods so that they can be used in reverse logistics.
- e) Consumer; interaction with consumers for implementing eco-design in products while making it a clean production and green packaging.
- f) Designing products with environmentally friendly objectives. (Masoumik M., 2014)

I. Benefits of Green Design in GSCM

When applying green design in a supply chain it reaps a number of benefits for example:

- a) More efficient production as mentioned in figure 7: a decrease in the total overall cost of manufacturing a product throughout the product life cycle if the green design is applied in the beginning stage of product development. Many multinational companies have recognised the importance of green design in

Supply chain management, like Ford, DHL, General Motors, P&G. (Klemeš & Klimes, 2015)

- b) Green design in GSCM helps in decreasing the adverse effects on the environment and increasing the total efficiency of resource/ raw material utilization. Therefore, eventually increasing the company's overall profit and decreasing the cost.

Currently, in the industry, there are 2 methodologies that aid in analysing and improving the product's design for it to be able to qualify in the eco-friendly product. Either by doing research and development on the effects of the product's design efficiency with respect to the environment through its end of life (EOL) disassembly and disposal. Or, through the installation of electrical devices like sensors in each product throughout its production cycle as it will help in providing critical information about the conditions and version on the important elements just before the disassembly of the product life cycle.

Environmental conscious design ECD can be defined as a process by which a company involves environmental variable as parameters for their product development. ECD helps in design decisions that have a direct effect on the product's environmental capability as these types of practices are focused on the green design of the product's life cycle. ECD takes place via the technological innovations and its goal is to design and redesign products, services, and processes so that there is a decrease in the impact that these products cause the environment. Through the ecological modernization theory, it can be explained that through the optimal use of technological innovations companies are able to overcome issues surrounding innovation. Therefore, attain complete operational processes for improving environmental performances. (Klemeš & Klimes, 2015)

ECD practices can consist of 2 techniques that help in the corporation and building client-supplier relations for working towards ECD products.

- 1) Firstly, when firms share information regarding to rectify the disruption of information on the organisational practices for example the development of new products, redesigning of old products, etc.
- 2) Secondly, when firms share information regarding environmental technologies that help in the co-development of the company products that are deemed recyclable as well as greener processes. Henceforth, both these techniques are compatible with the ECD practices a company takes it up. (Iyyanki V. Murali Krishna, Valli Manickam, 2017)
- 3) Green design is the most crucial component of GSCM because this stage has the most effect on the PLC of the entire project system. The design has the power to diminish the environmental impacts caused by the establishment of the previous product, its design, and its processes; the main goal of green design is to show case new products designs that are sustainable. (Iyyanki V. Murali Krishna, Valli Manickam, 2017)

Green Design = Product design+ sustainability (environmental considerations). The green design includes environmental risk management, product safety, occupational health and safety, prevention of pollution, raw material and natural resources conservation and waste management. (Srivastava, 2007)



Figure 7 - Eco-Design benefits

(Iberdrola-Euro funding, 2019)

II. Implementation of Green Design

To implement a green design in a company there are many ways such as:

- 1) The product designers identify and analyse raw materials to replace the current non-environmentally friendly ones, energy-saving product designs and renovation of infrastructure to maximise efficacy.
- 2) Product selection- the design of the product should be one where the product is deemed safe for use, has minimum effect on the environment i.e., does not cause/causes minimal pollution along with this consumes the least energy throughout its product life cycle PLC. The product must not be dangerous when storing, transporting, and disposing off after the end of its PLC. (Srivastava, 2007)
- 3) DFE- design for environment is when product designers create a product that has zero negative side effects on the entire eco-system, are cost-effective and environmentally friendly. (Srivastava, 2007)
- 4) Organisation's configurational approach helps in design focusing on the alignment between the various available design components i.e. strategy, process organisational

structure approach on supplier selection, demand patterns, inventory strategy, head-time focus, manufacturing focus, product design strategy human resources, product eco-design, use of clean energy and technology, green supply, purchasing of material and product, investment recovery are the most crucial practices for the configurational approach theory.

- 5) Product designing and development are an array of ways to reduce the total environmental effects inherited while developing new products and production processes. Green product design consists of 2 methodologies; environmentally conscious design ECD and Lifecycle assessment LCA. LCA is when a company's product design team focuses on analysing the adverse environmental effects caused by the company's products and processes over their complete life cycle (PLC). LCA is used as an essential tool for expanding environmental rules and regulations, taxes, etc. It has the capability to decrease the negative environmental impacts and is used by the company to strengthen its product expansion. ECD; is a tool where there are concepts and practices related to designing products taking into consideration the environment. ECD has 2 phases; a) design for recycling (DFR) i.e., to help in making eco-friendly decisions when choosing the right materials, b) design for disassembly (DFD) this too helps the company to classify some product specifications which decreased the product's structural complexity when the total number of parts is lessened, there is an increase in the common harmful effects on the environment. (Iyyanki V. Murali Krishna, Valli Manickam, 2017)
- 6) Environmental performance of new products- assess the environmental performance of available alternate waste management options for utilization. Using alternative eco-friendly raw materials.

III. Assessments

To be able to measure the implantation of the green design in a business is done on a sustainable level the company will need to take into account a form of assessment that will help them to analyse their progress on a routine basis.

Assessment criteria for implementing the green design in a company will comprise of:

- 1) Check if the company has implemented environmental conscious design.
- 2) Using life cycle analysis/assessment to determine the environmental impacts caused by the product over its entire product life cycle.
- 3) While designing products for the company, monitoring if the designers pay attention in trying out various innovative ways by which they can reduce the quantity of the usage of raw materials used in producing the products.

1.3 Component 3: Green Distribution (Green warehousing and transportation)

Green distribution in the supply chain consists of 2 main operations which are green packaging and green logistics (Sustainable logistics is the method of reducing the logistics industry's impact on the environment). When transporting a product all the characteristics of the packaging have to be taken into consideration such as the size, shape, and material as this has direct control on the distribution as well as the effect on the product's transport characteristics.

Going green in warehousing by restructuring and innovation with cost-saving initiatives can be advantageous to the company. Sustainable warehousing can be achieved by limiting wastage, reduction in the energy costs and through efficiency improvement. (Rettab, B, Ben Brik., A, 2008)

I. Benefits of Green Warehouse (G.W.)

Some of the benefits of implementing green strategies in the warehouse are:

- a) The cost of the utility bill decreases.
- b) Reduction in company's overall carbon footprint and at the same time increase in the sustainability of the company.
- c) Being an environmentally conscious company, which stakeholders like to become a part of. (Murray, 2018)

When trying to implement green warehousing strategic planning and analysis is not the only deciding factors for attracting stakeholders. A sustainable warehouse is when there is a decrease in the company's impact on the environment. (Murray, 2018)

- **Objectives of Green Warehousing**

The main objectives of green warehousing are as follows:

- a) To stay competitive and be on the leading edge by going green in the warehouse
- b) To make warehouse energy efficient and therefore,
- c) Decrease the company's overall carbon footprint by decreasing the warehouse's carbon footprint. (Murray, 2018)

II. Implementation of Green Warehousing (G.W.)

In order to apply green warehousing in a company successfully the company needs to take some steps such as:

- 1) Lighting system plan- sustainable alternative; a warehouses' highest expense is the lightning system as shown in figure 8; that is estimated to be as much as 65 per cent of the operating costs for the company. Sustainable lighting is the way to go green for a warehouse along with adding solar panels to the warehouse.

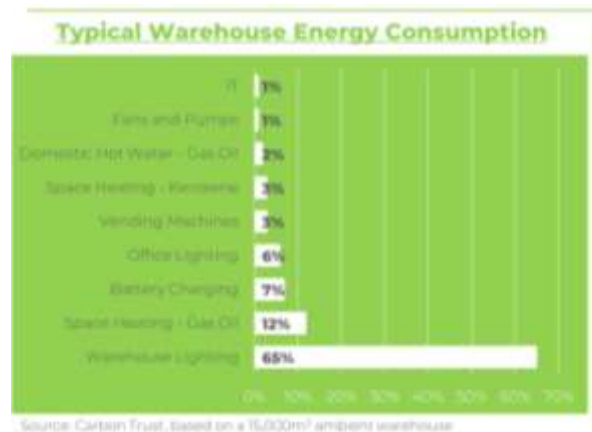


Figure 8 - Energy consumption – warehouse

(Green Warehouse Practices - Running an Eco-Friendly Storage Warehouse, 2018)

- 2) **Light-off policy-** In break rooms and rest rooms when no one is present in them using timers and sensors will help in ensuring that this policy is abided by. Intelligent lighting (sensor light bulbs), this will help minimize the lighting power and consumption by 10%. An intelligent lighting system helps in monitoring the available daylight and the warehouse's occupancy to learn if lightning needs to be switched on and that depicts its brightness. (Green Warehouse Practices: Running an Eco-Friendly Storage Warehouse, 2018)
- 3) **LED lightning-** is the most energy-saving and efficient compared to fluorescents and incandescent lighting as proved through table 1. This low-energy LED lightning uses less electricity, even though they increase the upfront cost as they are expensive but switching to LED will reap benefits in the form of reduced lightning costs and electricity bill, increased impact on the environment and swapping of light bulbs overtime will also not be needed, therefore, less wastage. LED lights provide bright light at the rate of 150 lumens per watt and waste less energy as heat as compared to traditional light bulbs. LED lightning does not only promote sustainable lightning but

also is best suited to the company's warehouse's needs. Because LED only projects light in 1 direction not wasting the light energy on unnecessary parts of the warehouse. Therefore, comparing to incandescent light bulbs, LED is highly energy-efficient because they use almost all their energy into lighting the space and making themselves last longer than other light bulbs. (How Energy-Efficient Light Bulbs Compare with Traditional Incandescent, n.d.)

Table 1 - Different light comparison

Comparisons between Traditional Incandescents, Halogen Incandescents, CFLs, and LEDs						
	60W Traditional Incandescent	43W Energy-Saving Incandescent	15W CFL		12W LED	
			60W Traditional	43W Halogen	60W Traditional	43W Halogen
Energy \$ Saved (%)	-	-25%	-75%	-65%	-75%-80%	-72%
Annual Energy Cost*	\$4.80	\$3.50	\$1.20		\$1.00	
Bulb Life	1000 hours	1000 to 3000 hours	10,000 hours		25,000 hours	

*Based on 2 hrs/day of usage, an electricity rate of 11 cents per kilowatt-hour, shown in U.S. dollars.

(Green Warehouse Practices: Running an Eco-Friendly Storage Warehouse, 2018)

The above table 1 is a comparison between 60-watt traditional incandescent and energy-efficient bulbs as these both have quite the same lighting levels.

- 4) Warehouse planning- as warehouses have a tendency to change their layouts over years because the products and equipment used in them and to move the products keep innovating and upgrading this results in the warehouses having insufficient lightning in some spaces of the warehouse. Therefore, developing a new layout plan that includes all the electrical lightning LED so as to take into consideration the equipment

racks, products, etc. that are present in the warehouse which casts shadows and find ways to eliminate it in the new plan hence, this will help in making sure that energy spent on lightning does not get wasted along with increasing the efficiency of the workers in the warehouse. Henceforth, having a change in the warehouse's lightning system plan to sustainable plan lighting fixtures by implementing eco-friendly strategies as mentioned will have a significant change in the lowering of expenditures of the company providing cost reduction productivity enhancement that eventually will offer a good return on investment on the initial investment in time, money, and energy. It has been proven that businesses that follow green practices observed a win-win scenario even though another energy and waste material is not taken into account. (Green Warehouse Practices: Running an Eco-Friendly Storage Warehouse, 2018)

- 5) Heating-switching from the temperature-controlled thermostat to a programmable thermostat.
- 6) Fan-de stratification fan improves the heating and cooling system of warehouses. They circulate air throughout the warehouse and maintain the temperature of the warehouse. Therefore, lowering the HVAC cost of the warehouse and cutting down the energy usage. (Stevens, 2014)
- 7) Solar panels and skylights- natural lightning helps keep overhead cost low. A solar panel can be installed anywhere where there is access to sunlight either on the roof of the warehouse or on the ground by investing in solar panels; a company can generate their own electricity eventually having complete control over the electricity of the warehouse i.e., a firm can use it to either supply power to the entire warehouse or only a specific part of it. Once the initial setup of the solar panel is complete it helps save cost by producing and through utilization; energy than a regular non-solar energy roof.

Having an eco-friendly roof can qualify firms for tax exemptions and municipal fees in some countries. So, this practice will make the warehouse a net-zero i.e., producing the exact amount of electricity for the exact amount of consumption of it resulting in complete elimination of the effect on the environment by the warehouse in terms of lightning. (Apparel Resources, 2021)

8) Sustainable equipment, machinery, and electricity.

The efficiency of machinery can be improved with the help of a process known as sub metering i.e., when a separate “sub” meter is attached to all the mechanical equipment in the warehouse with the help of a warehouse management software system it will record and monitor important data of the machine, like its consumption on electricity, water, and gas. This will help in finding out methods to increase the equipment’s efficiency, curb technical mechanical errors, finding out the consumption levels of each machinery and improve operations. (Agyabeng-Mensah, Y., Ahenkorah, E., Afum, E., DaCosta, E. and Tian, Z. 2020)

- 9) Green Packaging- switching regular traditional packaging with better options and rearranged loading patterns will reduce the number of materials used, the amount of handling time on the other hand there will be more space utilization in the warehouse. During the implementation of green packaging company’s use “green” packaging supplies, put into practice returnable packaging processes which are best suited for the company, delivering goods directly to customer’s delivery locations and lastly distribution of the products all at once rather than in small quantities. (Levins, 2018)
- 10) Green Transportation- Under green logistics companies need to see the social and environmental factors that are affected during the distribution process, this can be somewhat achieved by looking at the material inputs and processes needed to move

the product to the point of its consumption. The best method for practising sustainable logistics operations is using the pooling of flows methodology which can be applied to the circuits, vehicles, and the company's warehouses. This is why, the most commonly implied green logistics measures by companies are, using of green transportation modes that causes the least pollution effect to the environment as this contributes to cutting down the carbon emissions with respect to transportation. (Stevens, 2014). Sustainable transportation can also be achieved when a company moves from traditional carbon burning vehicles to energy-efficient vehicles and, using transportation methods like rechargeable electric cars or hybrid vehicles, these electric trucks, mini vehicles emit the least number of gases and carbon footprint because, these battery-running electric trucks, cars and side-loaders do not require oil, gas, or fossil fuels. Therefore, creating a much safer and sustainable transportation mode. (igps.com, 2018)

Companies are also going back to using railway shipping for good's transportation purposes as it is deemed to be more energy-efficient within a country. (igps.com, 2018)

Another method to decrease waste and increase the efficiency of product shipping is by using lighter and reusable shipping pallets. (igps.com, 2018)

III. Assessments

To assess green warehousing, green transportation and green packaging in a company following criteria checklist can be used to do the needful:

- 1) In the warehouse; the company needs to check if they are using LED lighting, plastic/wooden pallets, vertical storage system, solar panels, destratification fans, programmable thermostat.
- 2) Using the eco-friendly mode of transportation. In the transportation and distribution stage; a business must make sure they try their best to use only eco-friendly vehicles, planning the routes and direction beforehand to avoid fuels wastage.
- 3) In the packaging stage, the company should try their best to use minimal packaging as this will just become a waste afterwards for the company. They should try switching to eco-friendly packaging.

1.4 Component 4: Green/Lean Manufacturing (operations)

Green manufacturing means taking social and environmental concerns into consideration during the product's manufacturing phase, by considering the material inputs and processes that go into the product. (Goodwin University, 2016)

- **Objectives of Green Manufacturing**

To undertake lean manufacturing a company, need to build some objectives to make it possible in implementing the operations below are a few objectives that can help in doing so:

- 1) To be able to manufacture the same quantity and quality of goods before implementing green manufacturing as the company was able to do during traditional SCM.
- 2) Green manufacturing management of the company will have to prioritize on conserving energy and preventing pollution caused through by-products.
- 3) Eradicating hazardous substances produced by the by-products during the manufacturing processes. (UK Essays, 2015)

I. Benefits of Green/Lean Manufacturing (operations)

There are many benefits of going green in the operations section of the company's supply chain such as those mentioned below:

- 1) **Reduced cost-** a business will notice a drop in their operating costs if they undertake certain green activities such as, powering the business with solar and wind energy, installing eco-friendly lighting system, reducing water usage when and where ever possible, using energy-efficient machinery and equipment, cutting down on water disposal needs, practice recycling in the entire company, going paperless for bills and documents, having a small and reduced supply chain of verified-certified and trusted suppliers than having a huge number of suppliers that are used occasionally by the business, carrying-out local deliveries. All these minimal changes will reduce the energy and utility bills, save supply costs, LED lighting will reduce the long-term electrical costs and lowered distribution costs. (UK Essays, 2015)
- 2) **Tax-** for businesses to be able to switch to a green supply chain often governments aid them in offsetting the costs with programs like tax credit and incentives as this makes it more motivational reforms for them to bring in green policies in the company.
- 3) **Company brand name-** going green not only benefits the company profits and the government but it also builds up the company reputation as consumers nowadays are well aware about the dangers caused by manufacturers on the environment. Therefore, sustainable manufacturing targets environmentally conscious consumers showcasing the company as an environmentally responsible company and help to highlight the perception of the brand henceforth, increasing the market share of the company giving it a competitive advantage against competitors.

- 4) Sustainability increases stability- the best benefit of green manufacturing is that it provides long-term stability to the company. As firms and customers are becoming aware about the importance of protecting the environment a responsible business must also do the same so survive in the industry. Sustainable manufacturing is directly dependant on sustainable production giving high yields and market stability for the long run. (UK Essays, 2015)

II. Implementation of Green/Lean Manufacturing

For any business that wants to change from the traditional supply chain to a green supply chain, it will have to focus on the most important aspect of the supply chain, which is the production phase, below are the ways by which implementation of green manufacturing can be done in a company:

- 1) Just in time (JIT)- following JIT management which is filling up the inventory at the right place at the right time so only that much will be manufactured as much goes out of the warehouse, this will eventually help the mass production of excess products and cause less burden to the environment as by doing so energy-usage and raw materials consumption will lessen. Following JIT management is the best way to avoid over-production. (Corporation., n.d.)
- 2) Partnerships-for businesses to run smoothly on green manufacturing it is crucial to closely monitor the sustainability initiative they practice, are reducing their cost. Having successful partnerships with the sourcing partners and a sufficient amount of visibility is the key to a successful green manufacturing. For a high-volume manufacturer, it is not only important but a must to work hand in hand with suppliers to ensure the green manufacturing goals are met and overall overheads are reduced substantially. This can be achieved by tracking, monitoring, and managing the total

operational costs (such as heat, gas, electricity) to sustain a cost-effective high-volume green manufacturing environment (HVM) and lastly by sharing the same kind of commitment for sustainability amongst the suppliers and the company.

- 3) Manage Shipment- a company must keep shipments as less as possible to decrease fuel cost and carbon footprint. (*Top 5 Benefits of Green Manufacturing*, 2014, New Jersey Manufacturing Extension Program, Inc. (NJMEP))

III. Assessments

During the manufacturing process of making the products, the business must ensure that they have assessed the green manufacturing of products by:

- 1) Follow just in time methodology.
- 2) Keep track of the greenhouse gas emissions released from the manufacturing of a single product.
- 3) Assess the raw materials and natural resources used in manufacturing the product and trying to find a cost-effective alternative for the product's operations and production.

1.5 Component 5: Reverse logistics

This is the last component of green supply chain management. In this phase of green supply chain management, a set of activities take place. This process starts after a product has fulfilled its purpose and now through reverse logistics where the firm addresses and handles the returning of the end-of-life product from the end-user back to the supplier or company. After which it is up to the supplier whether they wish to repurpose it, plant, recycle, re-use or refurbish the end product. This is also referred to as a closed-loop system. Other activities of R.L.; are collecting the end product, filtering, and selecting the product, re-processing them in

the manufacturing unit and redistributing them and lastly careful and sustainable disposal of the product. (Tsui, 2016)

- **Objectives of reverse logistics are as follows:**

- 1) The primary aim of doing R.L. is to be able to extract value from assets (product) to increase maximum return on income and decreasing expenses.
- 2) Help boost the overall effectiveness supply chain by dividing its operations.
- 3) A highly strategized R.L. policy in a company can decrease the storage of warehouse and distribution cost.
- 4) Increase company reputation in the industry.
- 5) Increase customer satisfaction.
- 6) Help create and complete a sustainable supply chain for the company i.e., closed-loop supply chain.
- 7) The company's return policy can be used as a competitive advantage. (Tsui J., 2016)

I. Benefits of Reverse Logistics

There are many benefits in following reverse logistics such as:

- 1) R.L. helps in decreased administrative, transportation and support cost simultaneously increasing the business's product velocity per point of distribution.
- 2) This will also help in increasing the number of satisfied customers that will directly show an effect on the increased market share of the company as well as retention amount.
- 3) R.L. being the last step to GSCM, it will help in increasing the company's operations in both directions (forward logistics and reverse logistics).
- 4) It is very essential to handle R.L. with the same amount of importance as outbound logistics in regard to strategy, operational management overhead and investments.

- 5) The best way to implement R.L. is by having a separate R.L. team and department in the company along with developing a separate strategy and R.L. chain as well. This will also help in managing a high volume of product returns. (Lee C., 2019)

II. Implementation of Reverse Logistics

Implementing reverse logistics in a company's supply chain is quite a complex process, if done properly it can provide a number of benefits in the business over the long run. And to be successful in this process is when;

- 1) A company deals with reverse logistics with the same level of strategy, importance, management oversight and investment as to the company would do for its outbound logistics unit.
- 2) Building up a smart strategy and a different reverse logistics chain is the most sought out approach for dealing with the high volumes of returns of products.
- 3) Another way to implement reverse logistics in business is by, appointing an experienced reverse logistics partner for the firm and working hand in hand with them. This will help to avoid first-hand mistakes and benefit from the professionally experienced who have attention to details and keeping the outbound logistics activities distinguished.
- 4) Creating a reverse logistics department to monitor, control and assess all the necessary processing activities of reverse logistics taking place instead of carrying operations via the outbound logistics department. (Lee C., 2019)

III. Assessments

For reverse logistics to be successfully applied in a company, the company must undergo an assessment checklist to not that whether they have reverse logistics in the company applied or not. For this below is a list to do so:

- 1) Does the company reuse their products?
- 2) Does the company recycle their products?
- 3) Does the company remanufacture their products?
- 4) Does the company understand the idea behind reverse logistics and its importance in supply chain management?
- 5) Does the company have an eco-friendly approach or techniques where they track the company's carbon footprints?

Chapter IV: Analysis and Results

1. Introduction

This chapter comprises of the data collected on Petco gulf and the analysis of the data with respect to the GSCM framework developed in the previous chapter. The data was gathered by a telephonic questionnaire which was interviewed on one of the sales representatives of Petco gulf and through the deductive and quantitative approach of methodology these data were assembled, analysed, and put forward together with the help of previous literature; in helping Petco gulf identify and implementing the need for switching from SCM to GSCM.

The data made available by Petco gulf was very limited, as they do not have any components relating to GSCM i.e., they do not follow the activities of GSC and are very much restricted to the traditional SCM. They do not have a framework relating to the GSCM in Petco gulf as they do not follow sustainability in the entire supply chain management at all.

2. Assessment of the framework in Petco gulf

To assess the current practices in Petco gulf with respect to the elements of GSCM. Below are the current practices that Petco gulf does in their supply chain and suggestions to implement the green supply chain.

- a) **Green procurement (procurement):** Petco gulf procures their PET material from Asian countries like India, China, etc. They use 100% virgin raw materials; that is, they do not use any kind of recycled PET. Therefore, Petco gulf FZE, does not practise

environmental-friendly purchasing which include the reduced, reused and recycling of raw materials in their purchasing department. Hence proving that there is no green procurement taking place. Neither do their suppliers have ISO standards of sustainability. Petco gulf does not have any sort of green procurement assessment criteria such as sustainability assessment standards or tender assessment standards.

- b) **Green design:** Petco gulf has many product designs of PET. They have standard and customised products designs (Petcogulf.com). They use an industrial machine to design and manufacture the PET products (standard/customised), but they do not focus on establishing and making the products line with green design. Therefore, in order to do so, they can start by keeping in mind the environmental factors and design the PET goods so as to decrease the environmental strain i.e. (reducing the use of raw materials in the product); as much as possible with little changes, for example: designing PET products like jars, etc with no fancy design and keeping the bottles and jars outlook design simple. Another way to introduce green design and practise it is by Petco gulf identifying their materials and processes that are dangerous to the environment and humans and trying to replace them with less risky and more environmental- friendly processes. Through the telephonic interview, it was found that they do not practice environmentally conscious design ECD or life cycle analysis LCA.
- c) **Green manufacturing:** when it comes to manufacturing the PET product like plastic bottles, jars, etc. also Petco gulf does not have any systems in place that help them in tracking if they have reduced the overall carbon footprint or done any other ways of manufacturing the PET products which are being less harmful to the environment. If Petco gulf uses green manufacturing this will help the company in decreasing the

ecological stress when they measure their green manufacturing components by using materials and technology that helps in this process. Petco gulf can start by carrying out field study which helps in techniques for consuming energy and resources for the flow systems that aid in decreasing the use of virgin material for Petco gulf. (PET) are Pinch analysis (Linhodd, 1993), industrial energy analysis (Boustead, 1979), energy and lifecycle analysis (Lee et. al, 1995).

- d) **Green distribution:** this includes packaging, transportation, logistics, activities (Rao & Holt, 2005). Petco gulf does not do any sorts of green distribution tasks and activities to overlook the supply chain management. They do not have any sort of sustainability practices in their warehouse be it solar panels, a lighting plan, etc. Although they do transport not only in the U.A.E. but globally as well their PET products. So, Petco gulf should change the normal distribution practices to be able to make it a green supply chain management with the green distribution. The element of green distribution which can be measured for Petco gulf are; green packaging, Petco gulf should also use eco-friendly packaging materials while transporting their goods to customers. For example, usage of recycled and storage boxes, eliminating the use of plastics tape by improvising on the packaging materials. Making use of green transportation and logistics by reviewing and analysing route options and choosing the best eco-friendly routes with less diesel consumption, consolidating customers' orders, rearranged loading patterns, rearrange the loading patterns, decrease the material usage, increase the warehouse space, and decrease the double handing and also using renewable energy wherever possible like a solar panel for their product storage warehouses (green warehousing). These better packaging designs and logistics techniques will help in energy saving and decreasing the carbon emissions.

- e) **Reverse logistics-** remanufacturing, green operations. Petco gulf only has its plants set up in the U.A.E. but they do transport their final goods to other parts of the world like Nigeria, Kenya, Saudi Arabia, Oman, etc. even though they operate in the U.A.E. they do not apply reverse logistics in their company. Once the PET product is manufactured using raw materials, they send it out to their customers and the Product life cycle closes there.

However, Petco gulf can use reverse logistics; in this, the first step is called as collection; used products and/or packaging should be collected from various places (like customer offices, etc.) and then moved to the storage facilities for remanufacturing, which includes the process of selecting, the PET on the basis of replacing, reuse, reconditioning, disassembly, reassembling, repackaging, and recycling the PET. This method will help Petco gulf reduce their PET waste as well as this will help them in cutting down their costs and making them an environmentally conscious company which will attract more business to the company. Reverse logistics systems consist of subjects relating to the condition request of these markets, which are, supply uncertainty, returns disposition decisions, postponement, and specification.

- f) **Remanufacturing:** Petco gulf can redesign their logistics network systems to be able to bring in product returns remanufacture, re-use of the product, its parts and components will also be profitable for Petco gulf. (Tibben-Lembke, 20002). Another way is that the company can operate their routes systematically in this way the location of the firm and the logistics connection should be taken into consideration so that the used product from the consumer reaches to the producer and the costs decreases.

Therefore, remanufacturing, and reverse logistics have a very low impact on the environment, highly efficient generating little or no waste pollution. This process of reverse logistics if used by Petco gulf will result in decreasing the raw materials, environmental and occupational safety cost, increased overall company's operations efficiency and help in building the company's name. Thus, contributing to the product recovery process by trying to reclaim meaningful value through re-utilization of the PET used products at the end of their product life cycle making it a green product life cycle for future product designs as well, to come into Petco Gulf FZE.

3. Implementing GSCM in Petco Gulf

From the data collected about Petco gulf, it has been summarized in the below table 2 about the current status of their supply chain in regard to it being GSCM and the changes that can occur if the conceptual framework of GSCM is applied in Petco gulf.

Table 2 - Implementing GSCM

The elements forming the conceptual framework	The current status of GSCM in Petco gulf	The key factors to implement the conceptual elements for GSCM in Petco gulf
Green product design	Through the research, it was found that Petco gulf does not have any assessment analysis in order to make their PET products with an eco-friendlier design.	They can start by introducing and applying LCA and ECD to make their product green and in making it stand out from competitor products.
Green procurement	The company uses virgin raw materials sourced from India, China, Vietnam, etc. and do not have any special relationship bond with their suppliers in order for both to produce sustainable materials.	Firstly, Petco gulf should bring in environmental standardisations, iso standards that they abide by then secondly, select suppliers that comply by those environmental standards in extracting the raw materials.
Green packaging, warehousing, transportation, and distribution.	No data found.	Green packaging: Petco gulf can ensure they use recycled material for packaging their products to

		<p>keep in the warehouse, as well as for green warehousing they can make a strategic plan to make the warehouse more sustainable starting from installing LED lights to use JIT software.</p> <p>Green transportation and distribution making contract with distributors that will help them achieve their green goals</p>
Green manufacturing	As they manufacture the PET and customised them too. This releases many greenhouse gas emissions and effluents.	<p>They need to make a plan to control and prevent their emissions and effluents.</p> <p>Using pinch analysis, life cycle and energy assessment.</p>
Reverse logistics	Petco gulf does not have any reverse logistics system yet.	By using the conceptual framework, Petco gulf can easily try to apply and implement reverse logistics

		with the help of strategic planning tools and systems.
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4. Action Plan

The table 3, is an example of an Action plan for implementing GSCM components in Petco gulf to make the supply chain greener. The below task that is chosen in the action plan are those that can be easily developed into reality and do not require much extra financing and/or labour.

Table 3- Action Plan

Task name	Criterion selection of eco-suppliers by developing a sustainable supply chain
Action	Petco gulf will need to change its entire supplier base or collaborate with its existing suppliers to adapt to the environmental selection criteria which require the suppliers to have environmental management systems in compliance with international standards like ISO 14000.
Department	Procurement department
Timeline	3 to 6 months
Resources	Finance, upgraded technology systems
Challenges	<ul style="list-style-type: none"> - Non-cooperation from existing suppliers, hence, persuading will be hard. - Finding eco-friendly suppliers.
Result Forecast (The possible outcomes if action is implemented)	<ul style="list-style-type: none"> - Petco gulf's new environmental objectives will be achieved. - Reduced overall cost and product waste. - Increase in profits. - Company's brand image – good “eco-friendly” company image.

Task name	Eco-Design of products
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Action	Updating the design of PET jars, bottles, etc. this will help reduce the use of energy and the raw material itself with the use of LCA analysis.
Department	Design or IT department
Timeline	1 to 3 months
Resources	Information technology, designers
Challenges	<ul style="list-style-type: none"> - Time required to find the right design that meets all the environmental goals and customer satisfaction. - The trial-and-error method to find the perfect design will have costs associated with it.
Result Forecast (The possible outcomes if action is implemented)	Long term benefits of saving on raw materials. Saving cost in long term; aids in reuse, recycling, and remanufacturing PET. Paves the way to the green market. Increased eco-efficiency.

Task name	Advanced green environmental technologies
Action	Petco gulf to deal with manufacturing unit needs to update their IT systems in order to be able to incorporate in their green manufacturing.
Department	Manufacturing
Timeline	3 months.
Resources	New systems technologies, financial investment
Challenges	<ul style="list-style-type: none"> - Approval from the company stakeholders. - Training employees
Result Forecast (The possible outcomes if action is implemented)	Increased performance sustainability via the reduction in waste and raw material cost, increase in production efficiency.

Task name	Eco-friendly packaging and Eco-friendly Transportation
Action	Petco gulf will have to implement on using eco-friendly packaging material. Find alternative routes for distribution that are most eco-friendly to the environment and reduce the company's cost. Using renewable energy in warehouses – solar panels
Department	Logistics
Timeline	2 – 4 months
Resources	R&D for routes and new packaging material
Challenges	<ul style="list-style-type: none"> - Training driver and employee. - Costs.

Result Forecast (The possible outcomes if action is implemented)	Increase profits by reducing packaging costs. More warehouses space. Decrease the firm's carbon footprint. Reduce fuel consumption cost. Enhance customer and public relation with Petco gulf.
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Task name	Remanufacturing
Action	Petco gulf will collect, sort, select PET used products and re-package them for selling them again
Department	Reverse logistics
Timeline	12 to 18 months
Resources	Nil
Challenges	<ul style="list-style-type: none"> - Time-consuming process. - Training the employees on the concept and processes of reverse logistics (remanufacturing). - Change in the PLC.
Result Forecast (The possible outcomes if action is implemented)	Waste management is improved. Reusing the materials again, closing the PLC loop of the PET products. Eventually, increase in the profits of the company.

Chapter V: Conclusion and Recommendation

This chapter includes the result of the study, its recommendations, limitations that occur and can occur if this is taken in the future for further work.

1. Conclusion

Through this research, a framework for implementing GSCM was developed which then was later applied to a company (Petco gulf); who follow the conventional supply chain management, this was possible because of the successful implementation of the research aims and objectives i.e. with the help of the framework developed it was easily possible to implement GSCM in Petco gulf and assess the previous SCM through the research methodologies used i.e., with the use of qualitative research approach by taking a telephonic interview with the help of a questionnaire; this gave an in-depth knowledge about the company's current systems and processes concerning SCM practices.

Other objectives that were achieved through the research study were; that; transitioning stages and steps were identified on ways by which any company/entity can easily shift from SCM to GSCM, and this helps in understanding the need for and importance of switching towards GSCM from SCM. Along with this to understand GSCM more precisely each of its components were also explained in a very detailed fashion.

The results of this study showcase that, the continuous and systematic utilization of GSCM components and its framework as seen in the action plan will help the company, the economy it is in, to grow vastly as well as simultaneously conserving the environment. This increases the welfare of the company's stakeholders, brand reputation, customer satisfaction,

profits, and market share of the company, all this have a positive effect on the performance of the company, because of GSCM. As it gives the company a competitive advantage over its competitors. Raw materials and resource management is made simple through GSCM. Implementation of GSCM is in build with a deep sense amongst the suppliers, causing them to only sources proper sustainable raw materials which are ISO certified meeting the environmental standards and for the company to manufacture sustainable PET products. The company will share its progress on achieving sustainability in the supply chain with its suppliers as it will help in improving the sourcing of its raw material and implementing GSCM throughout the organizational structure with the involvement of all the stakeholders.

With implications of the conceptual green supply chain framework, Petco gulf's supply chain will definitely notice improvements and success. Applying LCA, ECD, DFR, and environmental ISO standardizations will only help the company to grow and stand out from the competitors. Through this, they can decrease their overheads extensively and eventually leading them to earn high amounts of gross profits for the long run.

2. Constraints and Limitations

As Petco gulf does not have any previous data collected on their supply chain management it was hard to compile and find much information on the procedures that they practice currently. Through the analysis and research methodology, it was found that they do not have any long-term goal for their supply chain management process. As well as making any changes to the current system will have to deal with all the stakeholders and their consents, especially the shareholders which will be hard to convince to invest in building up a new changed supply chain as this will decrease their return on investments for a short period of time. Other limitations were the amount of data available from the company, as this is would not be the case for a multi-national company.

3. Recommendations and future works

To implement the green supply chain management process smoothly into their previous system. The company will need to work together with all their stakeholders into consideration. They will need to build a long-term plan and build communication channels exceptionally for implementing this plan. The research and development team will have to be set up to plan out the conceptual framework to be able to apply it in actuality. Training of the employees, suppliers, etc. is also of prime importance. Starting by building SMART goals could be Petco gulf's first step towards a successful GSC system. In the future, the research can be done on a qualitative approach to add more substantial facts and evidence supporting the research objectives. Secondly doing a comparative side by side study on a company that follows the conventional supply chain management and another company that follows Green SCM belonging to the same sector and industry.

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Appendix

Dessertation TimeLine																
Sr.No.	Activity	May	June	July	August	Sep	Oct	Nov	Dec	Jan	Feb	March	April	May	June	
1	Topic and company chosen															
2	Proposal Submission															
3	TimeLine (Task Activity) submission and Ethical form submission															
4	Literature review															
5	Primary Data Review															
6	Analysis and recommendation discussions															
7	Conclusion															